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years for related and unrelated recipients, respectively. Two year overall survival was 42% and disease-free survival was 36%, with disease stages and cytogenetic risks being major determinants for outcome. Patients transplanted in CR1 had 2-year overall survivals of 40% after related and 57% after unrelated HCT. We conclude that HCT from related and unrelated donors after low-dose TBI is a promising treatment for elderly patients and medically infirm younger patients with AML not eligible for conventional HCT.

81

FEWER EARLY BACTERIAL AND VIRAL INFECTIONS FOLLOWING NON-MYELOABLATIVE VS. MYELOABLATIVE CONDITIONING FOR ALLO-TRANSPLANTATION

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To examine the incidence and timing of infectious complications, we reviewed 141 consecutive lymphoma patients receiving allogeneic hematopoietic stem cell transplantation using either myeloablative (MA) (n = 65) or non-myeloablative (NMA) (n = 76) conditioning. The NMA cohort was older (48.4 vs 41.4 years, $P < .01$), more often given unrelated umbilical cord blood as a stem cell source (43% vs 9%, $P < .01$), had comparable CMV seropositivity (39% vs 49%) and 39% had received a prior autologous transplant. All patients received antimicrobial prophylaxis including an extended spectrum fluoroquinolone, fluconazole, and acyclovir in addition to weekly CMV surveillance. The time to initial infection was determined for each patient to analyze potential differences in types and time to onset of infection between the cohorts. For this, patients were evaluated once in each of three microbial categories bacterial, viral, and fungal (Table 1). Fatal infections were uncommon and the incidence was similar in the MA and NMA cohorts [MA: 12 (18%); NMA: 12 (16%)]. In the peri-transplant period (day 0-30), the MA cohort had 2.2-fold greater primary bacterial infections, but the risks of initial bacterial infection were similar in the early (day 31-100) and late (day 101-365) post transplant periods. Viral infections were twice as frequent in the MA cohort during the peritransplant period though similar from day 30-100. Beyond day 100, the MA cohort again had 2-fold greater primary viral infections. Fungal infections developed in approximately 10% of patients in both cohorts and the risks were similar during all three time periods. These data demonstrate a significantly greater incidence of bacterial and viral peri-transplant infections using MA conditioning though infectious mortality was similar using either conditioning. Quicker engraftment and shorter periods of neutropenia may explain in part the reduced incidence of initial peri-transplant bacterial infections in the NMA cohort, but the pathophysiology underlying the later infectious risks is uncertain. Immune reconstitution is delayed after both MA and NMA conditioning but protection against infection appears similar using either treatment approach. Future studies to correlate immune reconstitution with infections are required to identify patients at greatest risk of later infections and to design new strategies for their prevention.

Table 1. *Incidence of Infections*

	Myeloablative	Non-myeloablative	*P*-Value
Bacterial			
Day 0–30	49% (36–62)	22% (13–32)	<.01
Day 31–100	47% (28–66)	48% (35–62)	NS
Day 101–365	23% (0–45)	11% (0–22)	NS
Viral			
Day 0–30	18% (9–28)	9% (3–16)	.08
Day 31–100	31% (17–45)	44% (32–56)	NS
Day 101–365	44% (25–64)	21% (7–35)	.05
Fungal			
Day 0–30	12% (4–21)	9% (3–16)	NS
Day 31–100	12% (3–21)	13% (5–22)	NS
Day 101–365	10% (1–20)	17% (7–28)	NS

82

ALLOGENEIC HEMATOPOIETIC CELL TRANSPLANTATION (ALLO HCT) FOR METASTATIC BREAST CANCER (MBC)

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We reviewed data on women who received allogeneic hematopoietic cell transplantation (HCT) for metastatic breast cancer at 16 centers participating in the CIBMTR and the EBMT between 1992 and 2000. Probabilities of transplant-related mortality (TRM), graft-vs-host disease (GVHD), disease relapse or progression, progression-free survival (PFS), and overall survival were determined. Seventy-five patients were identified; median age at transplantation was 41 years (range, 25-60). Median follow-up time for survivors was 25 months (range, 3-64). Thirty-nine patients (52%) received myeloablative conditioning regimens and 36 (48%) received reduced-intensity conditioning (RIC) regimens. Nine of the RIC patients were treated with a planned tandem autologous-allogeneic approach. Patient characteristics were similar between the two groups except that more patients in the RIC group (72%) had poor pretransplant performance status than in the myeloablative group (28%). More patients in the myeloablative group developed acute GVHD (44% vs 34% at 100 days), chronic GVHD (36% vs. 8% at one year) and TRM (29% vs 7% at 100 days) compared to RIC. Overall response rates (complete or partial response) were 31% in the myeloablative group and 29% in the RIC group. Eleven of 42 patients (26%) who underwent immune manipulation (withdrawal of immunosuppression and/or donor lymphocyte infusion) after transplantation had disease control (complete, partial, minor, or stable response), providing evidence of a graft-vs-tumor (GVT) effect. Overall survival at 2 yrs was 24% (15-35%) for all patients. PFS at 1 year was 23% for myeloablative patients and 8% for RIC (excludes planned tandem) patients. Development of acute GVHD after an RIC regimen compared to no GVHD reduced the risk of relapse or progression (RR 3.05, $P = .03$) in multivariate analysis, consistent with a GVT effect, but this did not affect PFS. These findings support development of innovative allotransplantation approaches to exploit GVT effects for disease control while minimizing TRM. Planned tandem autologous-allogeneic RIC HCT, where probabilities of TRM and PFS at 2 years were 11% and 44% respectively for a small number of patients in these data, may represent such an alternative approach.

83

HAEMOPOIETIC STEM CELL TRANSPLANTS FOR CHRONIC MYELOFIBROSIS—A REVIEW FROM THE ABMTRR

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The Australasian Bone Marrow Transplant Recipient Registry (ABMTRR) has been recording activity and outcome data for haemopoietic stem cell transplants in Australia since 1992 and New Zealand since 1998. Between 1992 and 2004 there were 50 haemopoietic stem cell transplants for chronic myelofibrosis in Australia and 1 in New Zealand. Of these, 46 were allogeneic, 3 syngeneic and 2 autologous; 35 were male and 16 were female. The median age at transplant was 48 with a range of 16 to 71. The annual number of transplants for this indication is small but increasing. In the five years 2000 to 2004, there were 33 transplants for this indication compared to 14 in 1995-1999. Of the donors for allogeneic transplants, 33 were HLA-identical siblings, 3 were siblings or other relatives with 1 HLA mismatch and 10 were unrelated volunteers. Within the allogeneic transplants performed

in 2000 and later, 6 used reduced intensity conditioning. Two patients had persistent disease, four died prior to 30 days post transplant and it was assumed that all others achieved remission. Four allogeneic and one autologous recipient relapsed, all within 3 years post transplant. For allogeneic transplants, the 5-year overall survival probability was 48% with lower and upper bounds of 31% and 65%, which is comparable to the finding of 47% in a recent EBMT study [1]. Transplant related mortality at 100 days was 19.6%. There were 16 deaths in the first year post transplant among allogeneic and syngeneic recipients, from infection (7), GVHD (4), organ failure (3) and persistent disease (2). Both autologous recipients died, from septicaemia at 6 months and relapse at 2.3 years post transplant. The ABMTRR is an important national data resource which enables accurate and timely analysis of transplant activity and outcome, particularly for rare indications that have relatively small numbers.

1. Guardiola P, et al. Allogeneic stem cell transplantation for agnogenic myeloid metaplasia: a European Group for Blood and Marrow Transplantation, Societe Francaise de Greffe de Moelle, Gruppo Italiano per il Trapianto del Midollo Osseo, and Fred Hutchinson Cancer Research Center collaborative study. *Blood*. 1999;93:2831-2838.

84

LOW INCIDENCE OF ACUTE GRAFT VERSUS HOST DISEASE AND REDUCED EARLY MORTALITY IN CP-CML PATIENTS TRANSPLANTED USING CSA, MTX AND MP AS IMMUNOPROPHYLAXIS

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Significant early transplant related mortality is one of the factors that have impacted the reduction of transplants for CML, especially in the imatinib era. However, curative potential of bone marrow transplantation has to be taken into consideration, especially for young high risk patients. **Patients and Methods:** We report here long-term results from a single center experience of 166 patients submitted to bone marrow transplantation for chronic phase CML from 1990 to 2004. All patients received marrow from sibling HLA identical donors, and used BU + CY as the conditioning regimen and cyclosporine, methotrexate and a short course of MP (1 mg/kg/day from day +14 to day +28, then tapered 20% per week) as immunoprophylaxis. Male: 92; female 74. Median age was 33 years (range 6-51). Median duration of disease was 20 months (4-87). Univariate and multivariate analysis of risk factors for survival were performed. Age, disease duration before transplant, female donor × male patient, time of engraftment, acute GVHD and chronic GVHD were analyzed risk factors. **Results:** Mortality before day +100 was 8%. Grade III-IV acute GVHD occurred in only 7% of the patients. From 153 patients who survived more than 100 days, 63 (38%) developed extensive chronic graft-versus-host disease. Median survival was 2498 days (58-5391). Overall survival and estimated disease free survival in 14 years was 71%. Only the presence of grade III-IV of acute and extensive chronic graft-versus-host disease were identified as independent risk factors for survival. Causes of death included: c-GVHD (13%), infections (9%) and progressive disease (7%). **Conclusions:** The addition of MP to the immunoprophylaxis regimen has effectively reduced the incidence of grade III-IV acute GVHD and early transplant related mortality. No influence was seen on chronic GVHD incidence, overall survival or disease free survival.

85

PREDICTIVE FACTORS AND IMPACT OF FULL DONOR T-CELL CHIMERISM AFTER REDUCED INTENSITY CONDITIONING (RIC) ALLOGENEIC STEM CELL TRANSPLANTATION (ALLO-SCT)

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The kinetics of lineage-specific chimerism proved to be an important issue after RIC allo-SCT. Here, we investigated the impact of different factors on the establishment of full donor CD3+ T cell chimerism (TCC) in a series of 102 patients receiving RIC allo-SCT from an HLA-identical sibling. 65 patients received an ATG-based RIC regimen (fludarabine, busulfan and ATG), 14 patients received a low dose TBI-based RIC (2 Gy), while the remaining 23 patients received an association of fludarabine, busulfan and total lymphoid irradiation (TLI; 1.7 Gy). At day 30, 30% (95% CI, 21-39%) of patients achieved a full TCC in the peripheral blood. At day 90, 77% (95% CI, 69-85%) had a full donor TCC. In univariate analysis, none of the patient, graft, RIC type, or disease characteristics could be predictive of establishment of an early full donor TCC at day 30. However, the group of 31 patients who achieved a full donor TCC by day 30, experienced a significantly higher incidence of grade 2-4 acute GVHD, in comparison to the group of 71 patients who were still in mixed TCC at day 30 (cumulative incidence, 61% vs. 35%; $P = .01$). When looking for predictive factors for full donor TCC at day 90, univariate analysis showed that diagnosis category, the RIC type (ATG, TBI or TLI-based RIC), a female donor, CD34+ cell dose, and CD4+ T cell dose, were significant or had a trend towards significant association with establishment of full donor TCC by day 90. In multivariate analysis, a diagnosis other than a myeloid malignancy, was the strongest parameter significantly predictive of establishment of full TCC at day 90 ($P = .007$; OR = 3.82; 95% CI, 1.4-10.1). Most importantly, the delayed establishment of full donor TCC in patients with myeloid malignancies translated towards a worsened PFS ($P = .06$) in the group of 15 patients who did not achieve full donor TCC at day 90 as compared to the group of 26 patients who achieved a full donor TCC. This worsened PFS was due to a significantly higher incidence of leukemia relapse among these 15 patients (6 relapses; 40%) as compared to none in the other group of 26 patients ($P = .002$). Overall, we conclude that cautious monitoring of the levels of donor TCC is mandatory after RIC allo-SCT, because this can improve patient outcomes through identification of patients at risk for acute GVHD, and disease progression, and guidance of early interventions with immunosuppressive drugs or DLI aimed at obviating these complications.

86

PENTOSTATIN, TBI AND EXTRACORPOREAL PHOTOPHERESIS FOR REDUCED-INTENSITY PREPARATION: SINGLE CENTER ADAPTATION OF THE TUFTS EXPERIENCE

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Conditioning regimens used in reduced intensity transplants are designed to optimize immune suppression to allowing for prompt engraftment and robust graft versus tumor effect. The Tufts regimen (Miller KB, et al. *Bone Marrow Transplant* 2004;34:881) has a reduced incidence of GVHD while demonstrating disease response using extracorporeal photopheresis (ECP), pentostatin 4 mg/m^2/day × 2 and a reduced dose of total body irradiation (TBI: 600 cGy given in 3 fractions). We treated 45 patients with a minimum of 6 months follow up, median age of 55 years (27-67); 33 patients were 50 years or older; 25 received sibling and 20 an unrelated donor (UD) transplant. All but one sibling transplant was a 6/6 match, whereas 8/20 UD transplants involved mismatched loci. GVHD prophylaxis consisted of tacrolimus and short course methotrexate in 43, tacrolimus/MMF in 1 and tacrolimus/sirolimus in 1. Seventeen patients had AML, 3 MDS, 2 ALL, 2 CML, 11 CLL, 8 NHL, 1 HD and 1 lymphoplasmacytic lymphoma. Eight of the 45 had prior stem cell transplantation. The median number of CD34+ cells infused was 4.54 million/kg. Nine patients were transplanted in CR or early disease phase. Five patients died before anticipated neutrophil recovery, 2 had no neutrophil nadir and median time to neutrophil engraftment was 14.5 days, and platelets recovered in 18.7 days. Donor chimerism at 30 days by VNTRs was 94% (range 34%-100%). The overall day 100 survival was 69% (31/45), with 80% (20/25) of sibling graft recipients alive and 55% (11/20) of UD recipients still living. Twelve patients developed regimen related toxicity. In five this manifested as ARDS or multiorgan